NERA
ECONOMIC CONSULTING

The Revised Cost of Capital for KPN's Wholesale Activities

A Final Report for ACM

5 November 2013

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1. Introduction

This report sets out our revised estimates of the cost of capital for KPN's wholesale fixed line telecommunications services as an input to the calculations of price caps. The revisions follow the CBb's September 2013 ruling to require ACM to revise its methodology for estimating the risk-free rate.

Taking account of the court's ruling we re-issue our April 2009 report entitled "The Cost of Capital for KPN's Wholesale Activities" (the "April 2009 Report") adjusting our estimates of the real risk-free rate and consequently the WACC. We do not review the other parameters of our April 2009 report as these were not part of the court's decision.

We also note that the April 2009 report contained chapters reviewing our October 2008 estimates, a review of Oxera's critique of NERA's October 2008 estimates and a review of the arguments brought forward by the Industry Group. We do not repeat these arguments in this report.

For a full derivation of the other cost of capital parameters (apart from the real risk-free rate and inflation) we refer the reader to our full cost of capital reports (the "January 2009 Reports"):

- NERA (January 2009) "The Cost of Capital for KPN's Wholesale Activities: A 3-year Estimate for 2009-11"; and
- NERA (January 2009) "The Cost of Capital for KPN's Wholesale Activities: A 1-year Estimate for 2007".

The "January 2009 Reports" used data up to end October 2008. The April 2009 report used market data up to 31 December 2008. We continue to use market data up to 31 December 2008. However, we adjust the assumed investment horizon to eight years in in line with the CBbs' ruling,

The report proceeds as follows:

- Section 2 presents our revised approach to estimating the risk-free rate, which is in line with the court ruling;
- Section 3 presents our final revised WACC estimates;

We do not revisit the WACC parameters that were not the subject of the CBb's decision. Our WACC calculation is leaves these unchanged relative to our April 2009 report. The appendix lists the bonds that we use to calculate the bond yields for each year.

2. NERA's Revised Approach to the Risk-free Rate

2.1. The Court's Ruling on the Risk-free Rate

KPN (and a number of other operators) challenged ACM's (then OPTA's) WPC-IIa Decision from 16 December 2009 in front of the "College van Beroep voor het bedrijfsleven" (CBb). On 23 September 2013 the CBb passed its final ruling on the matter.[1]

The CBb found that ACM should have used government bonds consistent with the maturity of KPN's assets of approximately eight years instead of short-term government bonds. The Court found that while ACM has justified its choice to rely on short-term government bonds with the fact that the maturity period of the government bond is consistent with the duration of the regulatory period (and therefore assumes that investors base their investment decision on the duration of the regulatory period), the court is of the view that capital is attracted by KPN for investments in its network, which has an average economic life of seven to eight years. The court therefore concluded that ACM should choose bonds with a similar maturity.[2]

KPN has further argued that since government bonds with a maturity of around eight years are rare, government bonds with a maturity of ten years should be used. The court has asked ACM to calculate a new WACC in which the risk-free rate is calculated on the basis of government bonds with a time to maturity of close to eight years, or longer with a maximum of ten years if necessary to obtain sufficient representative data.

2.2. NERA Methodology

Below we set out our methodology for calculating the risk-free rate in line with the Court's ruling. To this end we first assess whether there is sufficient data from bonds with a maturity of (around) 8 years or whether bonds with a maturity of 10 years should be used instead. We then calculate the risk-free rate based on bonds with a maturity of (approximately) 8 years as we do not find evidence that the yield data derived from these is any less robust than the data derived from 10-year maturity bonds.

We use Eurozone nominal government bonds to estimate the risk-free rate. We focus on Dutch and German nominal government bonds, noting that the German government bond market is the largest and most liquid government bond market in the Eurozone. This choice is in line with our original approach as presented in our "January 2009 reports" and "April 2009 report".

In selecting a sample of bonds with a maturity of approximately 8 years we have included all bonds, which mature between 7 and 9 years after the averaging period (i.e. bonds maturing

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1 CBb (23 Sept 2013): Uitspraak in de zaken 09/376,10/96 en 10/97 en tussenuitspraak in de zaak 10/72 met als partijen (…) ("the CBb Decision")

2 CBb Decision, para 9.4.2.

between 2013 and 2015 for the observation year 2006, bonds maturing between 2014 and 2016 for the observation year 2007, etc.). We compiled a comparable sample of bonds with a maturity of approximately 10 years in the same way using bonds maturing between 9 and 11 years from the year of observation respectively.

2.3. NERA Findings on Relative Suitability of 8Y and 10Y Bonds

We have analysed the liquidity and the sample size of German and Dutch government bonds with a remaining life of 8 years and compared it with a sample of bonds with 10 years of remaining life.

Table 2.1
Number of Bonds fulfilling our Criteria in a Single Year

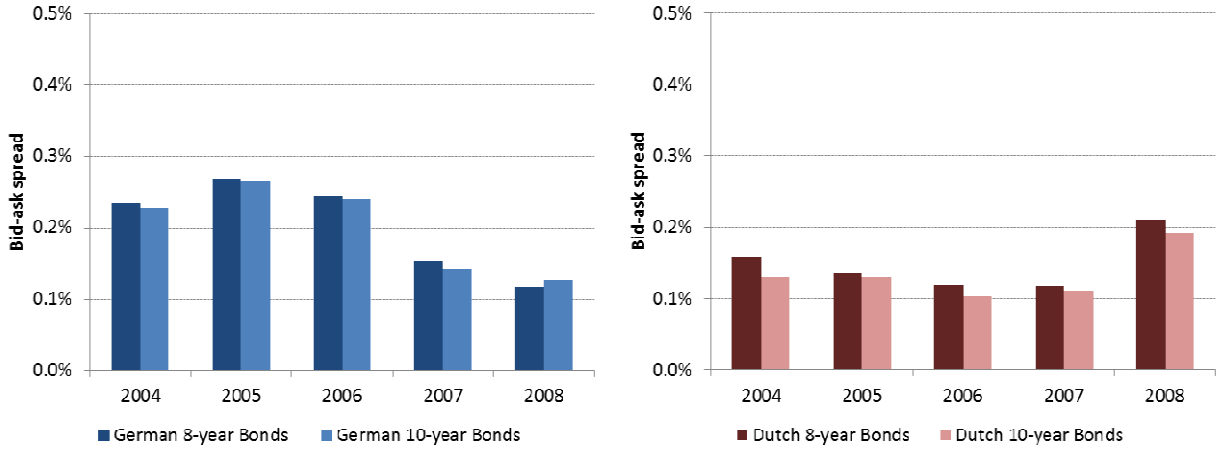
	Germany		Netherlands	
Year / Maturity	8-year	10-year	8-year	10-year
2004	6	5	3	2
2005	6	7	3	2
2006	6	7	3	2
2007	8	7	3	2
2008	8	5	3	2
Average	**6.8**	**6.2**	**3.0**	**2.0**

Source: NERA analysis of Bloomberg data. "8-year" refers to bonds maturing between 7 and 9 years from the observation year while "10-year" refers to bonds maturing between 9 and 11 years from the observation year.

Contrary to KPN's suggestions the findings in Table 2.1 show that the number of bonds with a maturity of approximately 8 years is larger than the number of bonds with a maturity of 10 years. This result appears intuitively plausible as any 10-year maturity bond will eventually become an 8-year maturity at some point during its life while the reverse is never true. Thus, even if KPN is right that more bonds are issued with a maturity of 10 years than 8 years, over the long term the number of traded bonds with 8 years of *remaining maturity* has to be at least as large as the number of bonds with 10 years remaining maturity.

However, 10-year maturity bonds may be more liquid than 8-year maturity bonds because of their "benchmark" function and may therefore be more suitable for determining a benchmark yield. We test for differences in liquidity by comparing the bid-ask spreads for the group of "8-year" and "10-year" bonds respectively. A higher bid-ask spread means a lower liquidity. Figure 2.1 shows that there is – if anything – a marginal difference in relative liquidity between the "8-year" and "10-year" maturity samples.

Figure 2.1
Relative Liquidity of "8-year" and "10-year" Bonds



Source: NERA analysis of Bloomberg data

We conclude that there is no convincing evidence that yields on bonds with a remaining life of 8 years are less liquid or in more scarce supply than those with 10 years remaining life. We have therefore opted for using bonds with a remaining life of approximately 8 years (+/- 1 year) as a way of fulfilling the requirements of the Court decision.

2.4. NERA Estimates of the Nominal Risk-free Rate

In line with the methodology in the April 2009 (and previous) reports we use trailing averages of yields to derive our estimate of the risk free rate. Our preferred estimate is based on 3-year averages, consistent with the length of the regulatory period. This approach has been applied by OPTA in previous price reviews.

Table 2.2
Estimates of the Nominal Risk-free Rate

	2007		2009-2011	
Year / Maturity	GER	NL	GER	NL
2004	3.82	3.88	n/a	n/a
2005	3.19	3.23	n/a	n/a
2006	3.72	3.73	3.72	3.73
2007	n/a	n/a	4.20	4.24
2008	n/a	n/a	3.93	4.12
3-year Average	**3.58**	**3.62**	**3.95**	**4.03**
Final Estimate	**3.60**		**3.99**	

Source: NERA analysis of Bloomberg data.

Based on the approach set out above we obtain the following estimates of the nominal risk-free rate.

- 3.58% for GER and 3.62% for NL for the period from 2004-2006, resulting in an average estimate of 3.60% for the 2007 estimate; and
- 3.95% for Germany and 4.03% for the Netherlands for the period from 2006-2008, resulting in an average estimate of 3.99% for the 2009-2011 estimate

In order to cross-check the validity of our results we also estimate the yield on an 8-year maturity government bond using Bloomberg's Fair Market Curve for an 8-year government bond.

Table 2.3
Comparison of yield estimates based on individual bonds and Bloomberg FMV curve

	Germany		Netherlands	
Year / Maturity	Bonds-based	FMVC	Bonds-based	FMVC
2004	3.82	3.88	3.88	3.90
2005	3.19	3.23	3.23	3.24
2006	3.72	3.73	3.73	3.73
2007	4.20	4.21	4.24	4.24
2008	3.93	3.93	4.12	4.10
Average 2004 - 2006	**3.58**	**3.61**	**3.62**	**3.62**
Difference 2004 - 2006	**0.04**		**<0.01**	
Average 2006 - 2008	**3.95**	**3.96**	**4.03**	**4.03**
Difference 2006 - 2008	**0.01**		**<0.01**	

Source: NERA analysis of Bloomberg data.

The above table shows a marginal difference of just 0 to 4 basis points. We conclude that the Bloomberg FMV curve validates the results from reviewing individual bonds.

2.5. NERA Estimate of the Real Risk-free Rate

In order to calculate the real risk-free rate we need to subtract a measure of expected inflation from the nominal risk-free rate. In keeping with the Court Decision we apply an investment horizon of 8 years and calculate expected inflation over an 8-year horizon. Consequently our estimates of inflation differ from our April 2009 report when we applied a 3-year horizon in line with our assumption on the maturity of the government bond.

Table 2.4 shows annual estimates of the real-risk free rate using 8-year nominal government bond rate and 8-year expected inflation during that year.

Table 2.4
Estimates of the Real Risk-free Rate by Year

Year / Maturity	Nominal RFR	Inflation	Real RFR
2004	3.85	1.93	1.89
2005	3.21	1.88	1.31
2006	3.73	1.94	1.75
2007	4.22	1.93	2.25
2008	4.02	2.03	1.96
Average 2004 - 2006	**3.60**	**1.91**	**1.65**
Average 2006 - 2008	**3.99**	**1.96**	**1.99**

Source: NERA analysis of Bloomberg and Consensus Economics data. Real Rfr calculated using the Fisher equation. Eurozone inflation over an 8Y horizon.

On the basis of the information in Table 2.4 we calculate the following estimates for the real risk-free rate:

- 1.65% for 2007 based on the averaging period from 2004 to 2006; and
- 1.99% for 2009-2011 based on the averaging period from 2006 to 2008.

3. Revised WACC Estimates

Table 3.1 presents our revised estimates of the cost of capital for KPN. These estimates are calculated using market data up to 31 December 2008 and a revised assumption about the investment horizon in line with the court ruling. As set out in section 2 we have revised our inflation assumption to be consistent with the court's view on the investor's investment horizon (which has also affected our estimate of the real cost of debt). We do not revisit the parameters that were not affected by the court's ruling on investment horizon. The derivation of these is set out in our "April 2009 report." Table 3.1 shows our final estimates for both the WACC for 2007 and for 2009-11.

These estimates reflect the Court decision that has obliged ACM to calculate the risk-free rate using 8-year government bonds if enough representative data is available (or alternatively 10-year maturity data). We find that bonds with a maturity of (approximately) 8 years provide sufficiently robust evidence on the risk-free rate and therefore do not pursue the 10-year maturity sample any further.

Table 3.1
NERA Final Estimate of KPN Cost of Capital After Court Ruling

	2007	2009-2011
Inflation	1.9%	2.0%
Cost of Equity		
Real Risk-free Rate	1.7%	2.0%
ERP	6.0%	6.1%
Asset Beta	0.53	0.54
Financial Gearing (D/(D+E))	33.8%	37.6%
Equity Beta	0.80	0.87
Real Post-tax Return on Equity	6.5%	7.3%
Cost of Debt		
Nominal Cost of Debt	4.8%	5.2%
Real Cost of Debt[1]	2.8%	3.2%
WACC		
Corporate tax rate	25.5%	25.5%
Real Post-tax WACC	5.0%	5.4%
Real Pre-tax WACC	**6.7%**	**7.3%**
Nominal post-tax WACC[1]	7.0%	7.5%
Nominal pre-tax WACC[1]	8.7%	9.4%

Source: NERA analysis. Note: (1): These nominal values are calculated from the relevant real values using the Fisher formula and the value for inflation

Our final real, pre-tax WACC estimates are respectively 0.3 percentage points and 0.2 percentage points higher than the April 2009 estimate for the 2007 and the 2009-2011 periods. This increase is due to the following factors:

- An increase in the real risk-free rate from 1.4% to 1.7% (for 2007) and 1.8% to 2.0% (for 2009-2011) respectively; and
- An increase in the real cost of debt from 2.6% to 2.8% (for 2007) while the real cost of debt for the 2009 to 2011 period remains unchanged to the first decimal point. This increase in the real cost of debt is a corollary of the court's view about the investor's planning horizon, which also has to be reflected in the inflation assumption that is used to deflate nominal values.

Appendix A. List of Bonds used to calculate Risk-free Rate Estimates

Table A.1
List of German Bonds used In 8Y RFR

			Included in 8Y RFR Sample in				
Ticker	**Issue Dt**	**Maturity**	**2004**	**2005**	**2006**	**2007**	**2008**
EC300211 Corp	20/10/2000	04/01/2011	Y	N	N	N	N
EC388499 Corp	25/05/2001	04/07/2011	Y	N	N	N	N
EC499398 Corp	04/01/2002	04/01/2012	Y	Y	N	N	N
EC601725 Corp	05/07/2002	04/07/2012	Y	Y	N	N	N
EC804906 Corp	10/01/2003	04/01/2013	Y	Y	Y	N	N
ED033382 Corp	04/07/2003	04/07/2013	Y	Y	Y	N	N
ED195422 Corp	31/10/2003	04/01/2014	N	Y	Y	Y	N
ED463939 Corp	28/05/2004	04/07/2014	N	Y	Y	Y	N
ED698221 Corp	26/11/2004	04/01/2015	N	N	Y	Y	Y
ED936651 Corp	20/05/2005	04/07/2015	N	N	Y	Y	Y
EF172933 Corp	25/11/2005	04/01/2016	N	N	N	Y	Y
ZZ207101 Corp	20/06/1986	20/06/2016	N	N	N	Y	Y
EF404897 Corp	19/05/2006	04/07/2016	N	N	N	Y	Y
ZZ207104 Corp	20/09/1986	20/09/2016	N	N	N	Y	Y
EF831838 Corp	17/11/2006	04/01/2017	N	N	N	N	Y
EG454536 Corp	25/05/2007	04/07/2017	N	N	N	N	Y
EH004740 Corp	16/11/2007	04/01/2018	N	N	N	N	N
EH375794 Corp	30/05/2008	04/07/2018	N	N	N	N	N
EH614270 Corp	14/11/2008	04/01/2019	N	N	N	N	N

Table A.2
List of German Bonds used In 10Y RFR

			Included in 10Y RFR Sample in				
Ticker	**Issue Dt**	**Maturity**	**2004**	**2005**	**2006**	**2007**	**2008**
EC300211 Corp	20/10/2000	04/01/2011	N	N	N	N	N
EC388499 Corp	25/05/2001	04/07/2011	N	N	N	N	N
EC499398 Corp	04/01/2002	04/01/2012	N	N	N	N	N
EC601725 Corp	05/07/2002	04/07/2012	N	N	N	N	N
EC804906 Corp	10/01/2003	04/01/2013	Y	N	N	N	N
ED033382 Corp	04/07/2003	04/07/2013	Y	N	N	N	N
ED195422 Corp	31/10/2003	04/01/2014	Y	Y	N	N	N
ED463939 Corp	28/05/2004	04/07/2014	Y	Y	N	N	N
ED698221 Corp	26/11/2004	04/01/2015	Y	Y	Y	N	N
ED936651 Corp	20/05/2005	04/07/2015	N	Y	Y	N	N
EF172933 Corp	25/11/2005	04/01/2016	N	Y	Y	Y	N
ZZ207101 Corp	20/06/1986	20/06/2016	N	Y	Y	Y	N
EF404897 Corp	19/05/2006	04/07/2016	N	N	Y	Y	N
ZZ207104 Corp	20/09/1986	20/09/2016	N	Y	Y	Y	N
EF831838 Corp	17/11/2006	04/01/2017	N	N	Y	Y	Y
EG454536 Corp	25/05/2007	04/07/2017	N	N	N	Y	Y
EH004740 Corp	16/11/2007	04/01/2018	N	N	N	Y	Y
EH375794 Corp	30/05/2008	04/07/2018	N	N	N	N	Y
EH614270 Corp	14/11/2008	04/01/2019	N	N	N	N	Y

Table A.3
List of Dutch Bonds used in 8Y RFR

			Included in 8Y RFR Sample in				
Ticker	**Issue Dt**	**Maturity**	**2004**	**2005**	**2006**	**2007**	**2008**
EC358388 Corp	16/03/2001	15/07/2011	Y	N	N	N	N
EC519761 Corp	15/02/2002	15/07/2012	Y	Y	N	N	N
EC810946 Corp	17/01/2003	15/07/2013	Y	Y	Y	N	N
ED390475 Corp	29/03/2004	15/07/2014	N	Y	Y	Y	N
ED990309 Corp	27/06/2005	15/07/2015	N	N	Y	Y	Y
EF551715 Corp	17/07/2006	15/07/2016	N	N	N	Y	Y
EG629393 Corp	16/07/2007	15/07/2017	N	N	N	N	Y
EH179537 Corp	25/02/2008	15/07/2018	N	N	N	N	N

Table A.4
List of Dutch Bonds used in 10Y RFR

			Included in 10Y RFR Sample in				
Ticker	**Issue Dt**	**Maturity**	**2004**	**2005**	**2006**	**2007**	**2008**
EC358388 Corp	16/03/2001	15/07/2011	N	N	N	N	N
EC519761 Corp	15/02/2002	15/07/2012	N	N	N	N	N
EC810946 Corp	17/01/2003	15/07/2013	Y	N	N	N	N
ED390475 Corp	29/03/2004	15/07/2014	Y	Y	N	N	N
ED990309 Corp	27/06/2005	15/07/2015	N	Y	Y	N	N
EF551715 Corp	17/07/2006	15/07/2016	N	N	Y	Y	N
EG629393 Corp	16/07/2007	15/07/2017	N	N	N	Y	Y
EH179537 Corp	25/02/2008	15/07/2018	N	N	N	N	Y

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